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PATENT SPECIFICATION

DRAWINGS ATTACHED

820,605



Date of Application and filing Complete Specification: Oct. 25, 1957.

No. 33407/57.

Complete Specification Published: Sept. 23, 1959.

Index at Acceptance:—Class 110(3), G2.

International Classification:—F02c.

COMPLETE SPECIFICATION

Improvements in and relating to the Driving of Auxiliaries of Combustion Turbine Engines

We, BLACKBURN AND GENERAL AIRCRAFT LIMITED, a British Company of Brough, East Yorkshire; NOEL PARKER COUPE, a British Subject of 46, Plantation Drive, Ferriby, East Yorkshire, and FRANK LITTLEFORD, a British Subject of The Oval, Brough, East Yorkshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to driving of auxiliaries by combustion turbine engines, particularly small gas turbine engines with shaft speeds of the order of 35,000 RPM.

Such drives due to the high speed of the engine shaft give rise to many difficulties and the conventional method is to employ a spur gear drive which necessitates a bifurcation of the air passage to the engine.

A bevel drive directly driven by the engine shaft, as with larger engines running at about 10,000 RPM, would in the case of small engines require to be of such large diameter that it would be unacceptable in practice, with the difficulties which would be encountered with the meshing of the gears and the size and length of the bevel gear shafts.

The difficulties are all the more when it is desired also to drive a gear-box or other equipment forwardly of the auxiliaries' take off and when as may be required, fuel or lubricant has to be fed through the engine shaft.

Now the object of the present invention is to provide an auxiliaries take off drive for combustion turbine engines which is compact and avoids having to sacrifice the aerodynamic characteristics of the engine air intake in that it may be annular, and which gives in itself a convenient speed reduction with the elimination of subsequent reduction gearing.

To this end according to the present invention spur gear teeth integral or fast with the engine shaft mesh with the teeth of a double planet wheel, the smaller gear of which meshes

with the internal teeth of a flanged drum mounted concentric with the engine shaft and terminating with bevel gear teeth which mesh with a bevel wheel on an output shaft.

The drum may drive one, two or more bevel wheels, each of which may drive an auxiliary, and as the speed reduction takes place in the epicyclic gear separate speed reductions in the auxiliary drives may be dispensed with with beneficial saving in weight. Furthermore as the speed of such bevel wheel or wheels will be relatively low the shaft thereof may be small, giving advantage in mounting and additional benefit in weight saving.

Still further according to the present invention as applied to a combustion turbine engine having an annular air intake, the shaft of the output bevel gear or each of them is housed in a strut supporting the compressor front bearing.

In order that the invention may be clearly understood and readily carried into effect, an embodiment thereof which is diagrammatically illustrated as a longitudinal section view in the accompanying drawings is hereinafter more fully described by way of example only and not of limitation.

In the said drawing, the shaft 1 of a combustion turbine engine is formed with spur gear teeth 2 which mesh with the larger ring of teeth 3 of a double planet wheel of which the smaller ring of teeth 4 mesh with the internal teeth 5 of the rim of a flanged drum 6 to form a reduction epicyclic gear. This drum 6 is mounted by supporting bearings 7, 8 concentric with the engine shaft 1 and terminates in bevel gear teeth 9 with which mesh one or more bevel wheels 10 on radial drive shafts 11 on each of which is conveniently a bevel gear 12 driving a bevel wheel 13 which directly or through a gear train drives one or more auxiliaries.

The engine shaft 1' beyond the gear teeth 2 may be used to drive a gear box or other equipment forwardly of the auxiliaries drive

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take off, and the gear is applicable also to hollow engine shafts through which fuel or lubricant has to be passed.

The gear may, by reason of its compactness, be contained in the "bullet" at the front of an engine when the bullet casing 14 supports the bearings 7, 8, and the shafts 11 may extend through supporting struts (indicated at 15) being those supporting the compressor front bearings which, by reason of the small size of such shafts as they are required only to transmit relatively low speeds, may narrow and cause minimum interference with the air flow through an annular air intake between the bullet and a spaced annular casing.

WHAT WE CLAIM IS:—

1. An auxiliaries drive from the shaft of a small combustion turbine engine in which spur gear teeth integral or fast with the engine shaft mesh with the teeth of a double planet wheel the smaller gear of which meshes with

the internal teeth of a flanged drum mounted concentric with the engine shaft and terminating with bevel gear teeth which mesh with a bevel wheel on an output shaft.

2. An auxiliaries drive from the shaft of a small combustion turbine engine as claimed in Claim 1 and as applied to an engine having an annular air-intake, in which the shaft of the output bevel gear or each of them is housed in a strut supporting the compressor front bearing.

3. An auxiliaries drive from the high speed engine shaft of a small combustion turbine engine substantially as hereinbefore described with reference to the accompanying drawings.

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Improvements in and relating to the Driving of Auxiliaries of Combustion Turbine Engines

... of a flanged drum

SPECIFICATION NO. 820,605

INVENTORS:— NOEL PARKER COUPE AND FRANK LITTLEFORD

By a direction given under Section 17(1) of the Patents Act 1949 this application proceeded in the name of The Blackburn Group Limited, a British company, of Brough, Yorkshire.

THE PATENT OFFICE,
4th December, 1959

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A bevel drive directly driven by the engine shaft, as with larger engines running at about 10,000 RPM, would in the case of small engines require to be of such large diameter that it would be unacceptable in practice, with the difficulties which would be encountered with the meshing of the gears and the size and length of the bevel gear shafts.

The difficulties are all the more when it is desired also to drive a gear-box or other equipment forwardly of the auxiliaries' take off and when as may be required, fuel or lubricant has to be fed through the engine shaft.

Now the object of the present invention is to provide an auxiliaries take off drive for combustion turbine engines which is compact and avoids having to sacrifice the aerodynamic characteristics of the engine air intake in that it may be annular, and which gives in itself a convenient speed reduction with the elimination of subsequent reduction gearing.

To this end according to the present invention spur gear teeth integral or fast with the engine shaft mesh with the teeth of a double planet wheel, the smaller gear of which meshes

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having an annular air intake, the shaft of the output bevel gear or each of them is housed in a strut supporting the compressor front bearing.

In order that the invention may be clearly understood and readily carried into effect, an embodiment thereof which is diagrammatically illustrated as a longitudinal section view in the accompanying drawings is hereinafter more fully described by way of example only and not of limitation.

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The engine shaft 1' beyond the gear teeth 2 may be used to drive a gear box or other equipment forwardly of the auxiliaries drive

820,605 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

